# Unraveling the association between obesity and climacteric symptoms: a generalized structural equation modeling approach

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**Abstract**

**Objective:** To assess the direct and indirect associations between obesity and the severity of menopausal symptoms in postmenopausal women, considering related conditions such as chronic diseases and physical activity.

**Methods:** This observational subanalysis utilized data from the REDLINC XII multinational study, which included 722 postmenopausal women aged 70 or younger from 9 Latin American countries. Menopausal symptoms were measured using the Menopause Rating Scale (MRS). Clinical, behavioral, and sociodemographic data were obtained through physician-administered surveys. Generalized Structural Equation Modeling was employed to examine the direct and indirect relationships between obesity, chronic cardiovascular and respiratory diseases, chronic hypertension, diabetes mellitus, and physical activity, and MRS scores. Odds ratios (ORs) were calculated to enhance interpretability.

**Results:** A total of 722 participants were included. Obesity was directly associated with higher MRS scores (OR = 1.75). In addition, obesity exhibited indirect associations with MRS scores, with an odds ratio of 19.07, through chronic arterial hypertension, diabetes mellitus, physical inactivity, and chronic cardiovascular or respiratory diseases. The total association between obesity and MRS scores was reflected in an OR of 33.45. Furthermore, physical inactivity and the use of antidepressants were associated with greater symptom severity, whereas higher educational attainment, regular physical activity, and menopausal hormone therapy were associated with lower MRS scores.

**Conclusions:** Obesity is strongly associated with more severe menopausal symptoms, both directly and through related chronic conditions and behavioral factors. Longitudinal studies are needed to establish temporal and causal inferences.

Received for publication March 15, 2025; accepted May 21, 2025.

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Funding/support: None reported.

Financial disclosure/conflicts of interest: K.T. has a current financial relationship with Exeltis and Vifor. The other authors have nothing to disclose.

J.E.B. and S.A.: study conception and design, text revision, reading of the final version, and statistical analysis. S.A., J.E.B., M.S.V., C.R., M.A.R., D.R.V., C.S., K.T., A.C., M.D., A.E., C.E., M.T.E., G.G.T., A.M.C., E.O., and M.N.: all other authors: data collection, text revision, and approval of the final version.

There are no linked research data sets for this article. The data from this study are not publicly available; however, they can be requested for research collaboration projects, taking into account ethical, privacy, and legislative issues.

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eISSN: 1530-0374

DOI: 10.1097/GME.0000000000002620

**Key Words:** Menopausal symptoms, Menopause Rating Scale, Obesity, Quality of life.

(*Menopause* 2026;33:48–56)

Menopause is a physiological stage in a woman's life characterized by the cessation of ovarian function and a decline in estrogen levels, leading to a series of metabolic changes and variable symptomatology.[1] Among the most common menopausal symptoms are hot flashes, night sweats, sleep disturbances, mood changes, and sexual dysfunction. However, the manifestation and severity of these symptoms may be modulated by individual factors, including obesity.[2-4]

Obesity is a global public health issue that disproportionately impacts postmenopausal women.[5] It plays a bidirectional role in menopause: on the one hand, adipose tissue acts as a source of estrogen by converting androgens into estrone, which may alleviate some vasomotor symptoms; on the other hand, obesity is linked to chronic inflammation, insulin resistance, and neuroendocrine alterations that can exacerbate other menopausal symptoms.[2]

Previous studies have found varying associations between obesity and menopausal symptoms, particularly vasomotor symptoms, depending on menopausal status.[2,6] In addition, obesity has been linked to greater severity of symptoms such as fatigue, sleep disturbances, and sexual dysfunction.[4,7,8] Excess adiposity may increase the risk of depression and anxiety in menopausal women, significantly compromising their quality of life.[7,8] Despite this evidence, the relationship between obesity and menopausal symptoms remains a topic of debate, as factors such as adipose tissue distribution, levels of physical activity, and the type of obesity (sarcopenic versus metabolic) may influence this association.[2,9-11]

In this context, the present study aims to explore the hypothesis that obesity and its associated conditions, including chronic cardiovascular and respiratory diseases, chronic hypertension, diabetes mellitus, and reduced physical activity levels, are associated with increased severity of menopausal symptoms. The findings of this study are expected to contribute to a better understanding of the role of obesity in menopause and help design more effective intervention strategies to improve women's quality of life during this stage of life.

## METHODS

### Study design and participants

This study is a subanalysis of observational multinational research conducted by the Latin American Network for Research of the Climacteric (REDLINC XII), which involved a survey assessing the clinical characteristics of menopausal women. The REDLINC XII research was carried out between January and October 2023 across 9 Latin American countries: Argentina, Bolivia, Brazil, Colombia, Costa Rica, Ecuador, Mexico, Panama, and Peru. The inclusion criteria encompassed postmenopausal women under 70 years of age who attended regular gynecologic health checks and provided prior informed consent for participation in the study.[12] Women who had undergone chemotherapy or radiotherapy had a bilateral oophorectomy, experienced menopause before the age of forty, or had a Body Mass Index (BMI) below 18.5 kg/m$^2$ were excluded from the subanalysis. Women with hearing or vision impairments, or those diagnosed with dementia, who may struggle to comprehend the questionnaires, were excluded from the study.

Physicians conducted surveys after obtaining informed consent from participants. Data were collected during clinical visits through direct patient interviews and reviews of medical records. The physicians performed physical measurements during the visits, and all information was documented on paper forms.

### Studied variables

The following continuous variables were recorded: age (in years), years of education, years since menopause, and BMI (calculated as weight in kilograms divided by the square of height in meters). Dichotomous variables (yes or no) were also included, such as obesity (BMI $\geq$ 30 kg/m$^2$), never having smoked, current physical activity (defined as performing more than 150 min a week of moderate aerobic activities like brisk walking, cycling, leisurely sports, and dancing), current use of menopausal hormone therapy, current use of antidepressant medications, chronic arterial hypertension (personal history of chronic arterial hypertension), diabetes mellitus (personal history of diabetes mellitus), hypercholesterolemia (personal history of hypercholesterolemia), cardiovascular or chronic respiratory disease (personal history of stroke, coronary heart disease, heart failure, or chronic obstructive pulmonary disease), and parents with chronic arterial hypertension (one or both parents with chronic arterial hypertension) as well as parents with history of diabetes (one or both parents with a history of diabetes mellitus).

Menopausal symptoms were assessed using the Menopause Rating Scale (MRS), a validated tool for assessing quality of life in middle-aged women, available in Spanish and Brazilian versions.[13] This scale comprises 11 items that evaluate menopausal symptoms, grouped into 3 subscales: (1) somatic, including hot flushes, heart discomfort, sleep issues, and muscle and joint pain, (2) psychological, including depressive mood, irritability, anxiety, and both physical and mental exhaustion, and (3) urogenital, encompassing sexual challenges, bladder issues, and vaginal dryness. Participants can rate each item on a scale from 0 (absent) to 4, where 0 = absent, 1 = mild, 2 = moderate, 3 = severe, and 4 = very severe. The total score for each subscale is the sum of the ratings for the items within that subscale. The overall MRS, calculated as the sum of the scores from all 3 subscales, was included as an outcome measure in this study.

To ensure the accuracy of the English language, the manuscript was reviewed using ChatGPT and Grammarly.

## Statistical analysis

The analysis was conducted using Stata (Stata Now/SE 19.5 for Mac, Apple Silicon; Copyright 1985-2025 StataCorp LLC). Quantitative variables were characterized based on their distribution, and relevant central tendency and dispersion estimates were calculated. The Shapiro-Wilk test was applied to establish the null hypothesis regarding the normal distribution. Nominal variables were expressed as proportions with their respective CIs.[14]

Preliminary analyses were conducted to explore the relationships between the variables and to inform the specification of the Generalized Structural Equation Model (GSEM). Locally Weighted Scatterplot Smoothing (LOWESS) and quantile regression were used to examine the association between continuous variables and MRS scores. Bivariate associations were also assessed using the phi coefficient for dichotomous variable pairs.[14] Phi values with an absolute magnitude of $\geq 0.30$ were considered indicative of potentially meaningful associations and were used to identify relevant relationships and potential collinearity before multivariate modeling.

GSEM provides a theoretical framework for simultaneously analyzing multiple interrelated variables that influence an ordinal outcome,[15,16] such as MRS scores. In this context, GSEM was employed to assess both direct and indirect associations between obesity and its related conditions, as well as the MRS scores. Direct associations refer to variables that are statistically associated with MRS scores. In contrast, indirect associations describe statistical relationships with MRS scores that appear to operate through one or more mediating variables within the model.

Multiple model specifications (stage models) were proposed to assess the associations of obesity and related independent variables with the outcome of interest. The proposed models were identified, estimated, and compared based on their log-likelihood, Akaike Information Criterion (AIC), and Bayesian Information Criterion (BIC).[15,16] The model selected was the one in which the estimated coefficients showed statistical significance, based on 2-tailed $P$ values of $<0.05$. After selection, the model's internal validity was assessed through calibration and discrimination.

Model calibration was defined as the agreement between predicted and observed outcomes.[17] In this study, calibration was considered adequate when observed (empirical) probabilities fell within the CIs of the predicted probabilities. Discrimination refers to the model's ability to distinguish between outcome categories correctly.[17] Receiver operating characteristic (ROC) curve analysis[18] was used to assess discrimination based on predicted probabilities. An MRS score $>22$ was defined as the threshold for clinically significant climacteric symptoms. An ROC area $>0.7$ was used as the criterion for acceptable discriminatory performance across all GSEM model specifications.

In the final selected model, the total, direct, and indirect associations of the independent variables with the MRS scores were estimated using the nonlinear combination of coefficients with SEs derived through the delta method.[15,16] The results were expressed as odds ratios (ORs) to facilitate interpretation and understanding.

## Ethical considerations

The protocol of the REDLINC XII study was revised and approved by the Ethics Committee of the Southern Metropolitan Health Service (Memorandum 15/2022, dated June 22, 2022), located in Santiago, Chile, and the study adheres to the principles outlined in the Declaration of Helsinki. Before participating, all participants were thoroughly informed about the study's aims and methodologies, following their provision of written consent to participate in the research.

# RESULTS

A total of 1,185 postmenopausal women with complete recorded data and who met the inclusion criteria were recruited for the study. We excluded 452 cases due to menopause before the age of 40 or previous bilateral oophorectomy. In addition, 11 women were excluded because their body mass index was below 18.5 kg/m$^2$. Thus, the observed cohort comprised 722 naturally postmenopausal women.

The age, years of education, years since menopause, and body mass index exhibited symmetric distributions and statistically significant Shapiro-Wilk test results ($P < 0.001$). The mean ± SD was 56.9 ± 5.8 years for age, 8 ± 5.5 years for years since menopause, and 26.8 ± 5.1 for body mass index. The median and interquartile range for the MRS were 10 and 12, respectively. Among the 722 participants, 159 (22%) were classified as obese (Table 1).

LOWESS analysis indicated a linear relationship between the MRS score and BMI. In contrast, age, years of education, and years since menopause did not exhibit a linear relationship with the MRS scores. In addition, quantile regression, using the MRS scores as the dependent variable, revealed a statistically significant

**TABLE 1.** Characteristics of the studied postmenopausal women

| Characteristics | N = 722 |
|---|---|
| Age (y, mean ± SD) | 56.9 ± 5.8 |
| Years of education (mean ± SD) | 13.6 ± 5.0 |
| Years since menopause (mean ± SD) | 8.0 ± 5.5 |
| Body mass index (kg/m$^2$; mean ± SD) | 26.8 ± 5.1 |
| Score of Menopause Rating Scale (median; IQR) | 10; 12 |
| Obesity; n (%) | 159 (22.0) |
| Never having smoked; n (%) | 531 (73.5) |
| Current physical activity; n (%) | 343 (47.5) |
| Current use of menopausal hormone therapy; n (%) | 127 (17.6) |
| Current use of antidepressant medications; n (%) | 106 (14.7) |
| Chronic arterial hypertension; n (%) | 226 (31.3) |
| Diabetes mellitus; n (%) | 88(12.2) |
| Hypercholesterolemia; n (%) | 183 (25.3) |
| Cardiovascular or chronic respiratory disease; n (%) | 60 (8.3) |
| Parents with chronic arterial hypertension; n (%) | 451 (62.5) |
| Parents with a history of diabetes; n (%) | 224 (31.0) |

IQR, interquartile range.

*P*-value ($P < 0.01$) for BMI. In contrast, no significant relationships were found for age, years of education, or the number of years since menopause. The absolute values of the phi coefficients between dichotomous variables were below 0.28.

Figure 1 illustrates the path diagram derived from the GSEM analysis, depicting significant direct and indirect associations between various clinical and behavioral factors and the total scores on the MRS. The model includes all the variables that were studied. The diagram also presents the corresponding odds ratios and CIs, offering a comprehensive overview of the model's relational structure. In this context, the following key finding is highlighted: obesity was directly associated with higher

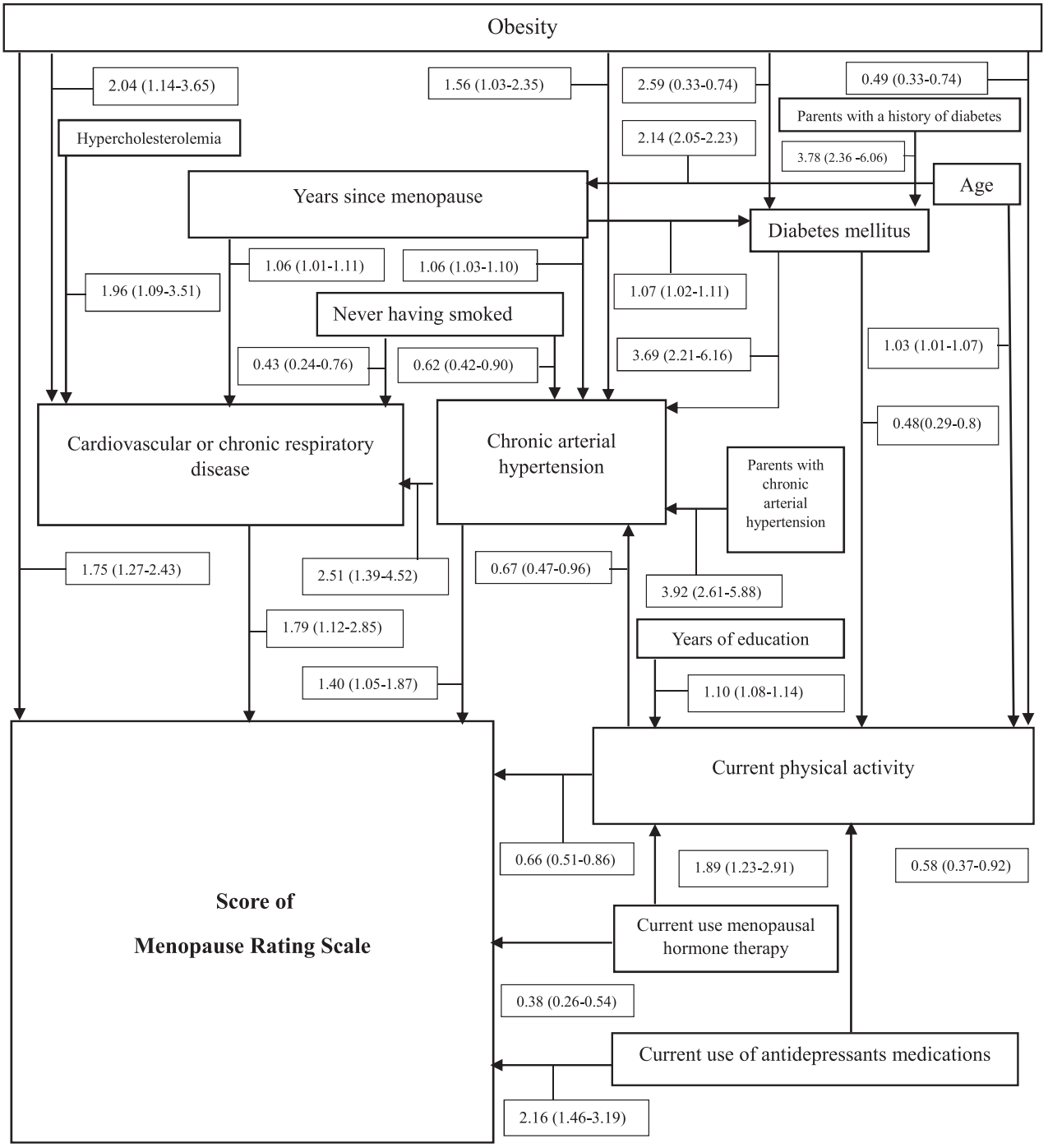


**FIG. 1.** Diagram of the GSEM analysis illustrating the combined association of obesity and other variables with the Menopause Rating Scale scores. Odd ratios (95% CIs). GSEM, Generalized Structural Equation Model.

**TABLE 2.** Odds ratios measuring total, indirect, and direct associations from the GSEM analysis of the combined association of obesity and other variables with the menopause rating scale scores

| Independent variable | Total association; OR (95% CI) | Indirect association; OR (95% CI) | Direct association; OR (95% CI) |
|---|---|---|---|
| Obesity | 33.45 (0.01[a]-98.60) | 19.07 (0.01[a]-56.57) | 1.75 (1.27-2.43) |
| Chronic arterial hypertension | 2.39 (0.99-3.79) | 1.70(0.77-2.64) | 1.40 (1.05-1.87) |
| Current use MHT | 0.23 (0.10-0.36) | 0.61 (0.34-0.89) | 0.38 (0.26-0.54) |
| Use of antidepressant medications | 3.27 (1.39-5.15) | 1.52 (0.85-2.18) | 2.16 (1.46-3.19) |
| Cardiovascular - respiratory disease | 1.79 (1.12-2.85) | — | 1.79 (1.12-2.85) |
| Current physical activity | 0.47 (0.25-069) | 0.70 (0.43- 0.98) | 0.66 (0.51-0.86) |
| Diabetes mellitus | 5.42 (1.04-11.59) | 5.42 (0.01-11.59) | — |
| Age | 1.21 (1.01-1.24) | 1.21 (1.01-1.24) | — |
| Years since menopause | 1.21 (1.04-1.38) | 1.21 (1.04-1.38) | — |
| Years of education | 0.93 (0.88-0.98) | 0.93 (0.88-0.98) | — |
| Never having smoked | 0.40 (0.10-0.71) | 0.40 (0.10-0.71) | — |
| Parents with chronic arterial hypertension | 3.29 (0.42-6.16) | 3.29 (0.42-6.16) | — |
| Parents with a history of diabetes | 9.49 (0.01-25.70) | 9.49 (0.01-25.70) | — |
| Hypercholesterolemia | 1.48 (0.80-2.16) | 1.48 (0.80-2.16) | — |

[a]Indicates a value $<0.01$.
GSEM, Generalized Structural Equation Model; MHT, menopausal hormone therapy.

MRS scores (OR = 1.75). In addition, its associations with chronic arterial hypertension, cardiovascular or chronic respiratory diseases, current physical activity, and diabetes mellitus contributed to an indirect association (OR = 19.07). The total association of obesity with MRS scores was an odds ratio of 33.45.

Table 2 presents the odds ratios with 95% CIs for the direct and indirect associations with the MRS scores for other variables included in the model: chronic arterial hypertension, cardiovascular or chronic respiratory diseases, the current use of antidepressants, current physical activity, current use of menopausal hormone therapy, diabetes mellitus, age, years since menopause, years of education, never having smoked, hypercholesterolemia, parents with chronic arterial hypertension and parents with a history of diabetes.

The model fit indices derived from the GSEM analysis, which underpin the previously presented results, were as follows: likelihood = −5559.9, AIC = 11,273.97, and BIC = 11,626.7. Furthermore, within this model, the following results were observed for each equation: (1) consistency between the observed probabilities and the CIs of the predicted probabilities, and (2) ROC areas $>0.7$ for the prediction of their respective outcomes.

## DISCUSSION

The MRS assesses women's quality of life and, according to our model, is directly associated with obesity, chronic arterial hypertension, chronic cardiovascular or respiratory diseases, current use of menopausal hormone therapy, current physical activity, and current use of antidepressant medications. In addition, indirect correlations were identified for these variables and others. To clarify the interpretation of the model derived from the GSEM analysis, we examine the variables that are directly correlated with women's climacteric symptoms and those that exhibit indirect correlations (Read to the following discussion, along with Fig. 1).

### Obesity

A direct and positive association was observed between obesity and the MRS scores. The direct odds ratio of 1.75 indicates that, independent of other factors, women with obesity have 75% higher odds of reporting more severe menopausal symptoms compared with nonobese women. This finding is consistent with previous studies[4,8,19] and may be explained by the impact of obesity on the serotonergic system in menopausal women. Specifically, obesity has been associated with reduced serotonin reuptake,[20-22] lower tryptophan availability[23,24] and alterations in 5HT2A and 5HT2C receptors,[25,26] which impair the regulation of feeding control, mood, sleep, and anxiety,[25] contributing to the somatic and psychological symptoms assessed by the MRS. The hypoestrogenism resulting from the decline in ovarian follicular function during menopause leads to decreased serotonin synthesis, release, and reuptake, as well as reduced availability of serotonergic receptors, particularly 5HT2A.[27] These changes contribute to the emergence of hot flashes, insomnia, irritability, and depressive and anxious symptoms,[28] which are characteristic of the somatic and psychological domains of the MRS. Therefore, the combined associations of obesity and menopausal status may explain the increased scores observed in these domains (somatic and psychological), ultimately contributing to a higher total score on the MRS. Furthermore, obesity increases intra-abdominal pressure, affecting the bladder and pelvic support structures, thereby contributing to genitourinary symptoms that exacerbate scores on the MRS.[29] In addition, lower self-esteem, which has been observed in some women with obesity,[30] may play a contributory role in the exacerbation of menopausal symptoms.[31]

Beyond its direct association, obesity was also indirectly linked with higher MRS scores, with an indirect odds ratio of 19.07. This strong indirect association, related to a higher prevalence of diabetes mellitus, chronic

arterial hypertension, chronic cardiovascular or respiratory diseases, and reduced current physical activity, indicates that obesity increases the odds of more severe menopausal symptoms by more than 18-fold through these intermediate factors, independently of its direct association and other covariates.

In summary, the total odds ratio of 33.45 between obesity and MRS scores indicates that, when considering both direct and indirect pathways—including related factors such as diabetes, hypertension, and physical inactivity—women with obesity have more than 33 times higher odds of reporting more severe menopausal symptoms compared with nonobese women. This highlights the importance of the association between obesity and menopausal symptoms, underscoring the need for clinicians to reinforce healthy lifestyle habits among their patients.

## Chronic arterial hypertension

The findings reveal a direct association between a history of chronic arterial hypertension and higher scores on the MRS, suggesting a diminished quality of life among menopausal women affected by this condition. Beyond this direct association, chronic hypertension also shows an indirect relationship with reduced menopausal quality of life, primarily mediated by its link to chronic cardiovascular and respiratory diseases. These associations are consistent with previous findings reported in the literature.[32-38] A plausible explanation is that chronic arterial hypertension, together with chronic cardiovascular and respiratory diseases, may contribute to dysregulation of the autonomic[39] and serotonergic systems,[40,41] thereby playing a role in the development and exacerbation of climacteric symptoms.

A personal history of chronic arterial hypertension was more frequent among women with obesity and a longer duration since menopause, as well as among those with a parental history of hypertension and a personal history of diabetes mellitus. These associations are consistent with the established role of these factors as recognized risk factors in the pathophysiology of chronic arterial hypertension.[32-34,42] Conversely, our study found that never having smoked and regularly engaging in physical activity were associated with lower odds of chronic arterial hypertension, in line with previous research.[33,42]

## Chronic cardiovascular or respiratory disease

A history of chronic cardiovascular or respiratory disease was directly associated with a higher score on the MRS. This association appears to align with findings from previous studies[35-38] and could potentially be explained by pathophysiological mechanisms[43-45] that have been described in the context of chronic arterial hypertension.

Our analysis suggests that a personal history of cardiovascular or respiratory diseases is more frequent among women with obesity, greater time since menopause, chronic arterial hypertension, and hypercholesterolemia. Conversely, never having smoked was associated with a lower frequency of these diseases. These findings are consistent with the established roles of these variables as contributors to cardiovascular or respiratory morbidity.[42,46,47]

## Current use of menopausal hormone therapy

In this study, the current use of menopausal hormone therapy was directly associated with a lower score on the MRS. This may be explained by the therapy's direct effects on the female genital tract, which help alleviate urogenital discomfort (urogenital domain), as well as by its modulatory influence on the serotonergic system within the central nervous system, potentially contributing to lower scores in the somatic and psychological domains of the MRS scale—including a reduction in vasomotor symptoms such as hot flashes.[48,49] Moreover, menopausal hormone therapy was positively associated with physical activity levels, consistent with prior evidence indicating that such treatment may enhance physical performance and functional capacity during menopause.[50]

## Current physical activity

The current physical activity was associated with a lower climacteric symptom score, as measured by the MRS, supporting previous studies that have reported the beneficial effects of physical exercise on quality of life during menopause.[51-53] This association may be mediated by several mechanisms, including enhanced brain aminergic synaptic transmission, increased endorphin levels, improved self-efficacy, diversion from stressful stimuli, microRNA-regulated physical activity-induced bone remodeling, and improved mitochondrial function.[54-56]

Our data also suggest that physical inactivity is correlated with a higher prevalence of obesity and diabetes mellitus. Given that physical activity increases caloric expenditure, women with obesity and diabetes are more likely to engage in lower levels of physical activity, which supports these results. These observations align with prior findings[57]and may reflect underlying physiological processes associated with sedentary behavior.[58]

Conversely, higher levels of physical activity were associated with current use of menopausal hormone therapy and a greater number of years of education. One possible explanation is that hormone therapy may improve physical performance, thereby promoting greater engagement in physical activity.[50] Moreover, experimental evidence suggests that higher educational attainment exerts a positive influence on physical activity levels.[59]

The observation that age is positively associated with higher levels of current physical activity is consistent with prior research, which indicates that physical activity tends to increase during midlife before declining in older age groups.[60] The explanation for this phenomenon is that certain sociodemographic factors, health indicators, and health behaviors may change over time, particularly with age, leading to changes in physical activity.[61] For example, changes in marital status, work hours, and the provision of care for children and other family members can all impact discretionary time and are associated with variations in physical activity levels.

### Current use of antidepressant medications

Our research found that the use of antidepressants was directly correlated with a higher score on the MRS. This finding is consistent with previous studies.[62-64] The direct association may be explained by hypoestrogenism during menopause, which alters the pharmacodynamics of antidepressants,[65] leading to reduced effectiveness and contributing to lower quality of life. Other factors that should be considered include treatment indication biases, side effects of antidepressants, and their inability to address estrogen-related symptoms such as vaginal dryness and urge incontinence.

Our data also indicate that the use of antidepressants is indirectly associated with reduced levels of physical activity and higher scores on the MRS. This association may be attributed both to the pharmacological side effects of antidepressants[66] and to the underlying depressive symptoms, which can diminish motivation to engage in physical exercise.[67]

### Limitatons and strengths

One of the main limitations of this study is that, due to its cross-sectional observational design, only associations can be established, and neither temporality nor causality can be inferred. Although the data set includes both current and retrospective information, all variables were collected at a single point in time, which makes it impossible to determine the directionality of the observed relationships. Moreover, the reliance on self-reported data for past events, such as age at menopause, introduces the possibility of memory bias. The BMI was recorded at the time of the study; however, the women attended health check-ups, and we assume that this value remained constant over time. Another limitation could stem from the lack of details about the menopausal hormone therapy used (estrogens or progestogens), as well as the method of administration or the duration of this therapy. Exercise participation was measured by self-report, and individuals tend to overestimate this. The simple classification of women as regularly active or not regularly active, based on their stage of change for exercise score, may be considered somewhat crude; however, this is a secondary outcome that does not alter the main findings.

However, the study has some important strengths. Firstly, it used a validated and widely accepted tool for assessing the quality of life in menopausal women. Secondly, to ensure the representativeness of natural menopause, we have included women who attend health check-ups and women with menopause before the age of forty were excluded. Women were also excluded with a body mass index of $< 18.5$ kg/m$^2$ because low weight could be a sign of other health conditions that affect brain health or could be an early indicator of dementia.[68] Thirdly, the study was conducted at multiple centers, and the assessment was performed by physicians specializing in women's health, which helps reduce potential bias. Fourthly, we performed multivariate statistical models to evaluate climacteric symptoms (an ordinal variable), thereby controlling for various possible confounding factors. It is essential to note that, although the results are valuable, they may not be representative of the entire Latin American population, due to limited access to preventive health check-ups in the region.

Ultimately, the primary contribution of this study lies in its integrative approach, which considers multiple interacting factors within a unified framework. This provides a more comprehensive perspective on obesity and its associated conditions, including chronic cardiovascular and respiratory diseases, chronic hypertension, diabetes mellitus, and reduced levels of physical activity, and their association with increased severity of menopausal symptoms. The results help inform the design of future prospective or longitudinal studies, which are better suited to evaluate temporal effects and mediation.

## CONCLUSIONS

The present study suggests that obesity is directly associated with a worsening of climacteric symptoms in women with natural menopause. It is also associated with reduced physical activity and an increased prevalence of pathologies such as diabetes mellitus and chronic respiratory and cardiovascular diseases, all of which could contribute to a deterioration in quality of life. In contrast, higher education levels, current physical activity, and the current use of menopausal hormone therapy were associated with a recovery quality of life of women with natural menopause. Future longitudinal prospective studies are needed to support the relationship between obesity and the quality of life of women determined in the current research.

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